

# AMERICAN MUSEUM *Novitates*

PUBLISHED BY THE AMERICAN MUSEUM OF NATURAL HISTORY  
CENTRAL PARK WEST AT 79TH STREET, NEW YORK, NY 10024  
Number 3223, 12 pp., 6 figures, 1 table April 6, 1998

## The Identity of Winge's *Lasiuromys villosus* and the Description of a New Genus of Echimyid Rodent (Rodentia: Echimyidae)

LOUISE H. EMMONS<sup>1</sup> AND MARÍA GUIOMAR VUCETICH<sup>2</sup>

### ABSTRACT

The painted tree rat, a large, strikingly patterned arboreal echimyid rodent variously identified as *Isothrix picta* or *Echimyus pictus*, differs in many major cranial characters from other living species of Echimyidae. In addition, a fossil collected by Lund at Lagoa Santa, Brazil, and referred by Winge to the genus now known as *Isothrix*, is clearly closely allied to it. We propose a new generic name, *Callistomys*, for these rodents and we describe and compare them to members

of the three genera into which they have at one time or another been placed: *Nelomys*, *Isothrix*, and *Echimyus*. The fossil may represent an undescribed species, but there is insufficient material to be confident in distinguishing it from *C. pictus* at this time. *Callistomys* shows some resemblances to Mid-Miocene and earlier fossil Echimyidae, and it may be more closely related to these than to other extant genera.

### RESUMEN

La rata pintada, un equímido arborícola grande, de coloración llamativa, designada distintamente como *Isothrix picta* o *Echimyus pictus*, difiere en muchos caracteres craneanos de otras especies de Echimyidae. Sin embargo, un fósil colectado por Lund en Lagoa Santa, Brasil, y

referido por Winge al género que actualmente se denomina *Isothrix*, está claramente relacionado con ella. Proponemos un nuevo nombre genérico, *Callistomys*, para estos roedores y los describimos y comparamos con los tres géneros en los cuales *pictus* fue alternativamente incluida:

<sup>1</sup> Research Associate, Department of Mammalogy, American Museum of Natural History; Research Associate, Smithsonian Institution, Division of Mammals MRC 108, Washington DC 20560.

<sup>2</sup> Profesor Ad-Honorem, Vertebrate Paleontology, Facultad de Ciencias Naturales y Museo de La Plata, Universidad Nacional de La Plata, Argentina.

*Nelomys*, *Isothrix* y *Echimys*. El fósil podría presentar una especie no descripta, pero el material disponible es insuficiente para sustentar la erección de una nueva especie. *Callistomys* tiene

ciertos parecidos con algunos equímidos del Mioceno temprano-medio, y se especula que podría estar más relacionado con ellos que con otros géneros vivientes.

## RESUMO

O rato-do-cacau, roedor equímideo arbóreo de notável padrão de pelagem que tem sido reconhecido pelos nomes *Isothrix picta* ou *Echimys pictus*, difere das outras espécies da família Echimyidae em muitos importantes caracteres crani-anos. Entretanto, um fóssil coletado por Lund em Lagoa Santa, Brasil, e colocado por Winge no gênero agora reconhecido como *Isothrix*, é claramente associado muito próximo ao rato-do-cacau. Aqui propomos um novo nome genérico a

esses roedores, *Callistomys*, os descrevemos e os comparamos aos três gêneros nos quais eles foram colocados historicamente: *Nelomys*, *Isothrix* ou *Echimys*. É possível que o fóssil represente uma espécie nova, mas no momento o material é insuficiente para ser distinguido de *C. pictus* com confiança. *Callistomys* mostra algumas semelhanças com fósseis da família Echimyidae do Mioceno médio e anterior, e especulamos que provavelmente seja mais próximo a estes do que a outros gêneros existentes.

## INTRODUCTION

The South American family Echimyidae is the most speciose of the living hystricognaths, and includes over half of all caviomorph taxa (Patton and Reig, 1989). Two or three subfamilies are usually recognized (Woods, 1982), but there has been no recent revision of the family or consensus on either the nomenclature or the contents of the several genera (Woods, 1993). A major difficulty in understanding the systematics of the family may result from the apparently artificial grouping within some genera of morphologically diverse species, so that the genera do not unite natural groups sharing clearly definable sets of characters. In this report we segregate as the sole member of a new genus within the subfamily Echimyinae (sensu Patton and Reig, 1989) a species, which during its taxonomic history has been shuffled back and forth among three other genera.

One of us (MGV) recently examined the fossil mandible collected by Lund at Lagoa Santa (Minas Gerais, Brazil) and tentatively identified by Winge (1888) as "*Lasiuromys villosus* Dev. ? 1852," a subjective synonym of *Isothrix bistriata*. We find that this fossil is close to the living rodent currently known as either *Isothrix picta* or *Echimys pictus*. Features of the Lagoa Santa fossil mandible and its two teeth suggest that it represents an undescribed species but, because of the

lack of material, we do not name it. Our comparative studies of fossil and living Echimyidae indicate that these rodents differ fundamentally from all other named echimyid genera, and thus we propose a new genus for them. Our view was forecast by Pictet (1843), who stated in his description of *Nelomys pictus*:

L'une de ces espèces se rapproche davantage des Nélomys [*N. pictus*] et l'autre des Echimys [*a. Trinomys*], sans toutefois que leurs caractères soient en tous points parfaitement identiques à ceux des autres espèces de ces genres. Je n'ai point voulu malgré ces légères différences en faire des genres nouveaux, car je crois que les naturalistes qui étudieraient dans son ensemble l'ordre difficile des Rongeurs seront mieux placés par cela, et qu'ils pourront mieux se rendre compte de la manière dont les variations de la dentition se lient avec celles des autres caractères. Ils introduiront par là une régularité et une unité qui manque trop souvent aux travaux de détail. (p. 203)<sup>3</sup>

<sup>3</sup> "One of these species is closest to *Nelomys* and the other [*a. Trinomys*] to *Echimys* [*Proechimys*], but their characters are not in all points identical to those of the other species in these genera. Despite these slight differences I did not want to make new genera for them, because I believe that naturalists who study the difficult order Rodentia as a whole will be better situated to do that, and will better understand how variation in the dentition is associated with that of other characters. They will thereby introduce some order and unity, which is so often lacking in works which treat only parts of a subject."

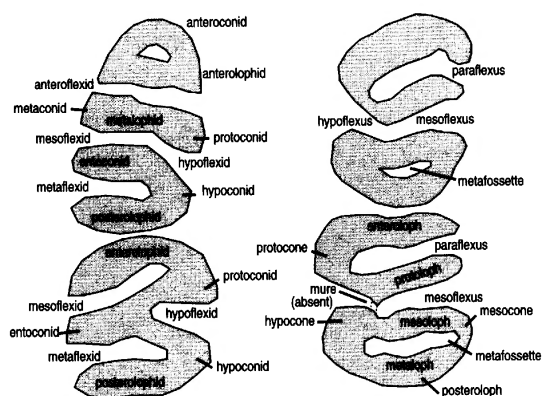


Fig. 1. Terminology of parts on schematic occlusal outlines of lower (left figure) and upper (right figure) premolars and first molars of *Echimyus chrysurus*, labial sides on right, anterior at top (nomenclature after Patterson and Wood, 1982).

### *Callistomys*, new genus

TYPE SPECIES: *Nelomys pictus* Pictet, 1843.

INCLUDED TAXA: *Callistomys pictus* (Pictet, 1843); *Callistomys* sp.? (Lagoa Santa fossil).

ETYMOLOGY: From the Greek *Callisto*, most beautiful, and *mys*, mouse; referring to the elegantly patterned black-and-white pelage.

DIAGNOSIS: Both upper and lower cheek-teeth high crowned, P4<sup>4</sup> and M1 unilaterally hypsodont (lingual side of crown higher than labial side, crown curved outward); P4-M3 tetralophodont, with three labial flexi and one lingual flexus; hypoflexi and mesoflexi deep, P4 completely divided by the joined hypoflexus-metaflexus into two, U-shaped lophs, with no mure; M1-3 with a narrow mure connecting protocone and hypocone (terminology as in fig. 1). Hypoflexids of p4-m3 set at a strong oblique angle, the medial end of the flexid far anterior to the labial end. Lower premolars tetralophodont, anteroconid and protoconid united, enclosing the anteroexternal flexid as a slitlike fossetid; anterior half of the tooth approximates a triangle with its axis slightly tipped anterolabially, the hypoflexids and metaflexids do not join (p4 is not

divided by a continuous flexid; fig. 2A). Lower incisors robust and strongly curved (fig. 3A). Skull with jugals expanded dorso-ventrally, lateral jugal fossa<sup>5</sup> wide and diffuse anteriorly, not coming to a sharp point; anterior edge of fossa above P4, anterior to a line extended from the posterior border of the ascending maxillary process of the zygomatic arch. Superior zygomatic root of maxillary expanded posteriorly. Tympanic auditory bulla inflated, with large auditory meatus on a strongly developed auditory tube (fig. 4A). Angular process of mandible strongly projecting ventrally with respect to the inferior projection of the symphysis, such that an angle drawn between the ventral posterior tip of the angular process and the occlusal plane of the tooththrow, with the apex at the anterior edge of the occlusal surface of p4, is greater than 30° (fig. 3A).

This diagnosis is based on *Callistomys pictus*; most characters of the fossil form described below are unknown. Because the original description lacks detail, we redescribe *C. pictus* below. Unfortunately, *Callistomys pictus* is represented by only a few specimens, most of them damaged; the type, as originally illustrated (Pictet, 1843), is missing the rear of the cranium, as is one of the two skulls in the Natural History Museum, London (BMNH), while the other was sectioned through the cranium and glued back together. As far as we know, only one other skull exists, in the Museu Nacional, Rio de Janeiro, Brazil. We have not examined the holotype in Geneva, which was illustrated with a color plate of the whole animal and figures of the skull and teeth (Pictet, 1843). Although the figures are not of high quality, the painting, figures, and description are consistent with each other and unambiguous: there is no other known rodent with the color pattern of *Callistomys*.

### *Callistomys pictus*

HOLOTYPE: *Nelomys pictus* Pictet, 1843

*Loncheres picta*: Waterhouse, 1848 (name combination).

<sup>4</sup> The premolars of Echimyidae are generally treated as retained, deciduous teeth (dP, dp; e.g., Wood, 1984), but as their homology has not been determined embryologically (Luckett, 1993), we use the simple term premolar (P, p), without judgment about their homology.

<sup>5</sup> Fossa for origin of M. masseter lateralis along the external ventral margin of the jugal and sometimes maxillary bones of the zygomatic arch.

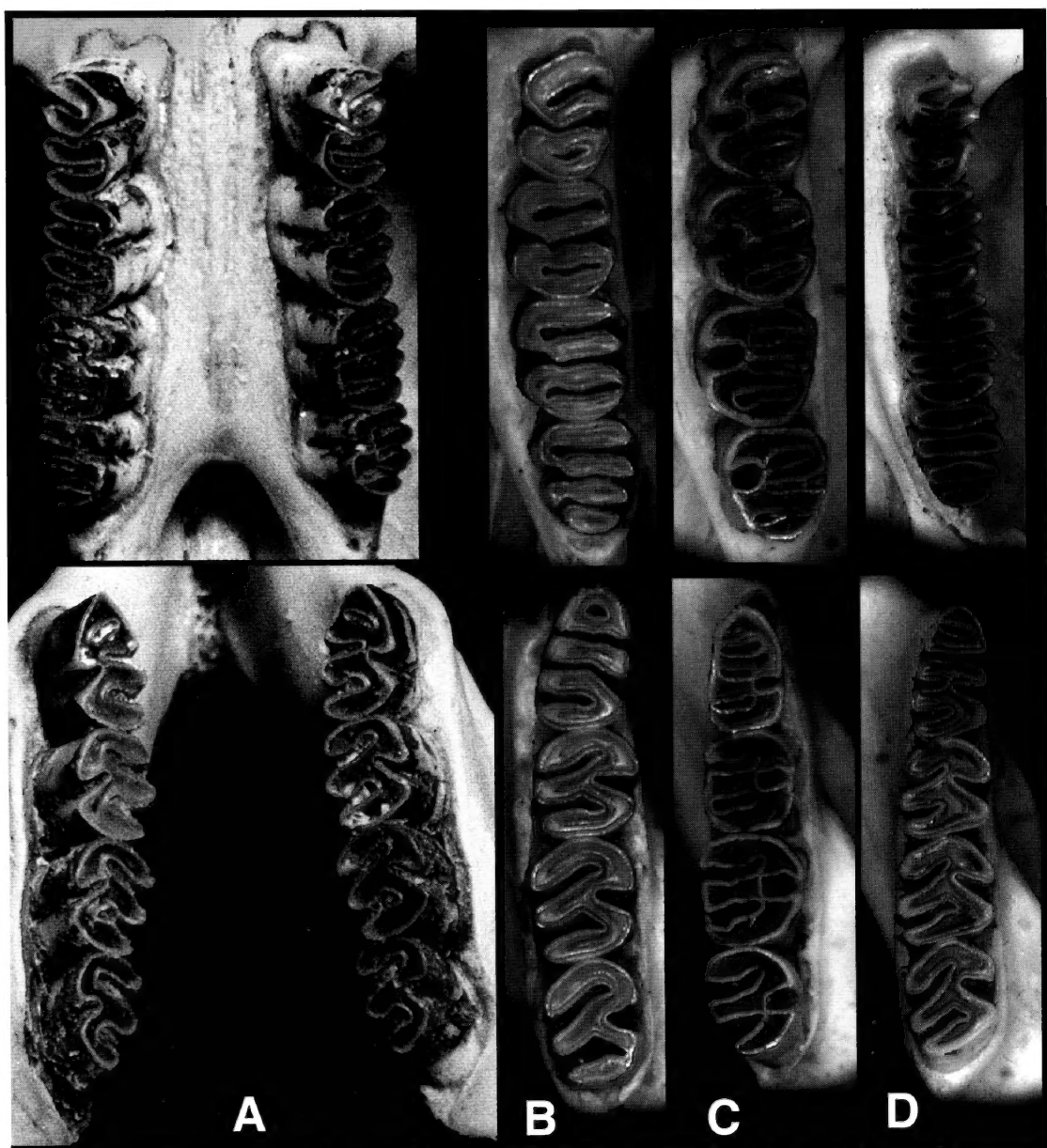


Fig. 2. Tooththrows of echimyid rodents: A, *Callistomys pictus*, Natural History Museum, London (BMNH) 80.9.15.1; B, *Echimyus chrysurus*, National Museum of Natural History (USNM) 549594; C, *Isothrix bistrata*, USNM 406375; D, *Nelomys nigrispinis*, Museu de Zoologia, São Paulo (MZUSP) 1951; Top row, maxillary teeth; bottom row, mandibular teeth.

*Isothrix picta*: Trouessart, 1881 (name combination).

*Echimyus pictus*: Tate, 1935 (name combination).

TYPE LOCALITY: Collected by M. Blanchet in Bahia, Brazil. Probably from Fazenda Al-

mada in the region north of the city of Ilhéus (fide Moojen, 1952).

DISTRIBUTION: Known only from the vicinity of Ilhéus, Bahia, Brazil.

DIAGNOSIS: Pelage with dense underfur but



Fig. 3. Mandibles of echimyid rodents: A, *Callistomys pictus*, BMNH 80.9.15.1; B, *Echimys chrysurus*, USNM 549594; C, *Nelomys medius* (holotype), BMNH 3.7.1.84; D, *Isothrix bistriata negrensis* (holotype), BMNH 20.7.1.20 (photo reversed).

lacking spines or bristles; tail densely haired throughout. Upperparts white with black dorsal markings and black tail base.<sup>6</sup> Skull and teeth as for genus; anterior tip of p4 forming a point such that anterior half of tooth is an almost perfect equilateral triangle; angle of opening of hypoflexids of p4-m2 relatively narrow, 45°; metaflexids of m1-2 narrow, almost parallel-sided, opening at an angle of about 10° (figs. 2A, 6B).

**DESCRIPTION:** Externally the most striking of all Echimyidae: a large, arboreally adapted rat with black-and-white patterned pelage (an excellent drawing of the animal, evidently from life, can be found in Moojen, 1952). External measurements (mm): head and body length, 250–295; tail, 273–325; hind foot, 43–47; ear 16 (holotype, Moojen, 1952, and specimens examined, N = 3). Pelage long and dense, hairs of uneven lengths; overhairs slender and soft, lacking spines or bristles; underfur dense, long, and wavy. Hairs brown at base with tips black or white; color entire-

ly whitish except for a sharply defined glossy black saddle covering dorsum from shoulders to tail, and across upper forelegs, and a wide black diamond-shaped patch extending over nape and crown, to between eyes. Tail black at base, distal part silky white above, golden yellow below; thickly covered with short, dense, flat-lying hairs. Ear pinnae small and inconspicuous. Vibrissae slender, the longest mystacial vibrissae reach to the shoulder when flattened back; the superciliary vibrissae reach to the ear tip. Lower legs and feet stout and broad, the toes long (based on skin BMNH 51.1.5.22).

Skull robust throughout, strongly convex in dorsal profile, the juncture of the nasals, frontals, and premaxillaries slightly swollen and elevated (fig. 4A). Rostrum broad, deep, and relatively short, with the lateral walls subparallel in ventral view. Lateral fossa for the attachment of *M. masseter medialis*, pars infraorbitalis, large, reaching anteriorly almost halfway across the premaxillary, as a sharply defined, pear-shaped depression with its base in the orbit (fig. 4A). From dorsal view, zygomatic arches bowed outward anteriorly. Supraorbital ridges parallel, interorbital region widest at about the midpoint of the frontals; posterior ends of the ridges lack

<sup>6</sup> In old specimens and in the original description (Pictet, 1843), the dorsal patches are brown. We follow Moojen (1952) and G. Fonseca (personal commun.), who saw living or fresh specimens, and assume that the brown is due to fading and that living animals are patterned with black.



Fig. 4. Skulls of echimyid rodents: **A**, *Callistomys pictus*, BMNH 80.9.15.1 (top and middle, missing rear of skull), BMNH 52.6.5.23 (bottom, has been entirely sectioned and reglued behind alisphenoid); **B**, *Echimyus chrysurus*, USNM 549594; **C**, *Isothrix bistrata negrensis* (holotype), BMNH 20.7.1.20; **D**, *Nelomys dasythrix* (co-type), BMNH 1.12.3.1 (top photo reversed).

lateral extensions at the frontal-squamosal suture, with little or no development of a ridge prolonging the supraorbital ridges across the parietal. Maxillary tooththrows slightly convergent anteriorly (fig. 4A). Mesopterygoid fossa rounded anteriorly and shallow: in BMNH 52.6.5.23 (fig. 4A) it reaches nearly the anterior edge of M3, but in BMNH 80.9.15.1 (fig. 2A) it reaches only to the hypoflexus.

*Callistomys* sp.

*Lasiuromys villosus*: Winge, 1888: 71 (not *Lasiuromys villosus* Deville, 1852).

**MATERIAL:** Fossil of partial left mandible with complete p4 and m1, teeth little worn, and m3 unerupted (figs. 4, 5). Collected by Lund and described by Winge (1888: p. 43, pl. VII, figs. 12, 13). No other specimens are known. The specimen is part of the paleontological collection in the Universitets Zoologisk Museum at Copenhagen; it has no catalog number.

**DISTRIBUTION:** Known only from Brazil; Lagoa Santa, Lapa do Capão Secco (Upper Pleistocene–Recent).

**DESCRIPTION:** Lower cheekteeth as for genus, hypoflexid of p4-m1 anteroposteriorly broad and rounded, opening at an angle of close to 70°; metaflexids likewise broad, about 30°, as broad as adjacent lophids; p4 anteriorly rounded (fig. 6). Angular process of the mandible strongly deflected downward (fig. 5). Measurements (in mm) of the teeth: p4-m1, 6.35; length p4, 3.25; anterior width p4, 1.90; posterior width p4, 2.10; length m1, 3.10; anterior width m1, 2.40; posterior width m1, 2.15.

**COMPARISON WITH *C. pictus*:** Compared to that of *C. pictus*, the mandible of the fossil is more slender and not as deep in the region of the incisor root below p4, and the angle formed by the curve of the superior surface within the diastema is shallower (figs. 2, 4). These features suggest a lesser curvature of the incisors. The angular region of the mandible from the attachment of the masseter under p4 to the posterior border of the mandible is relatively longer in the fossil (figs. 2A, 4). Some of these differences in proportions may result from the immature age of the fossil. On both teeth the flexids on each side open

at wider angles than do those of *C. pictus*, and the apex of p4 is rounded rather than pointed (fig. 6).

## COMPARISONS WITH OTHER GENERA

We restrict our comparisons to the three genera in which *C. pictus* has variously been placed: *Nelomys*, *Isothrix*, and *Echimys* (sensu strictu, excluding *Makalata*). A broader comparison including analysis of characters of all genera will be forthcoming in another report.

**PELAGE:** *Isothrix* spp. are large arboreal rats with soft, dense fur and tails fully clothed throughout with long hairs that curl outward. *Echimys* and *Nelomys* are medium-sized to large arboreal rats whose pelage includes many spines and/or stiff bristles, and whose tails are moderately to densely covered throughout their length with short hair. Because its fur lacks spines or bristles, *C. pictus* is most similar to *Isothrix* in pelage; however, among Echimyidae its dense, conspicuously wavy underfur and very fine, soft, overhairs closely resemble only the pelage of the montane echimyine, *Diplomys rufodorsalis*, and the montane dactylomyines. The overhairs of *Isothrix* spp. and lowland *Diplomys* spp. are much wider than those of *C. pictus* and slightly stiff. The dorsal longitudinal sulcus, usually prominent and visible to the naked eye in both the aristiforms of spiny echimyids and the largest overhairs of soft-furred echimyids, is present in the overhairs of *C. pictus*, as observed by Pictet (1843) and confirmed by us, but it is only visible microscopically, as a slight indentation on the hair. Some *Isothrix* have yellow or white crowns, black stripes on the head, and contrasting tail-tips; while *Echimys* have white tail-tips and one species has a white facial blaze. These are the only echimyids to share a strongly patterned pelage with *C. pictus*.

**TEETH:** *Callistomys pictus* differs from all other Echimyinae in its unilaterally hypsodont P4 and M1 and its higher-crowned cheek teeth. Its dentition differs radically from that of *Isothrix* spp., which have a unique loph pattern that distinguishes them from all other echimyines (fig. 2C). The cheekteeth of *Isothrix* spp. are brachydont and small, with molars subcircular in occlu-



Fig. 5. *Callistomys* sp., Lagoa Santa, Universitets Zoologisk Museum, Copenhagen. Scale 5 mm.

sal outline. In all other genera including *C. pictus* the molars are squarish or rectangular. In *Isothrix* spp. all hypoflexi of both upper and lower premolars and molars are oval to subcircular, enclosed (or nearly so) internally by a mure. The lophs bordering the hypoflexi converge labially to nearly join at the rim of the tooth (they join with wear). In *C. pictus* and other echimyines the hypoflexi are V-shaped or slitlike, with the adjacent lophs diverging labially (fig. 2). The hypoflexids of the lower cheekteeth of *Isothrix* spp. slant slightly backward, such that the lingual end of the flexid is slightly posterior to the labial end. In *C. pictus* and other echimyines the hypoflexids slant in the reverse direction,

obliquely forward, with the lingual ends of the hypoflexids anterior to the labial ends.

In both *Echimyis* and *Nelomys* spp. the upper and lower cheekteeth are higher-crowned (mesodont) than those of *Isothrix* spp., but not as high as those of *C. pictus*. The overall pattern of lophs and flexi of the maxillary cheekteeth of *C. pictus* is similar to that of *Echimyis* spp., but because the latter lack a mure in M1-3, the unworn molars are completely divided into anterior and posterior U-shaped lophs. The lophs of *C. pictus* widen medially and are banana-shaped, whereas those of *Echimyis* are narrow and more parallel sided (figs. 2, 5). In *Nelomys* spp. the unworn maxillary cheekteeth are completely



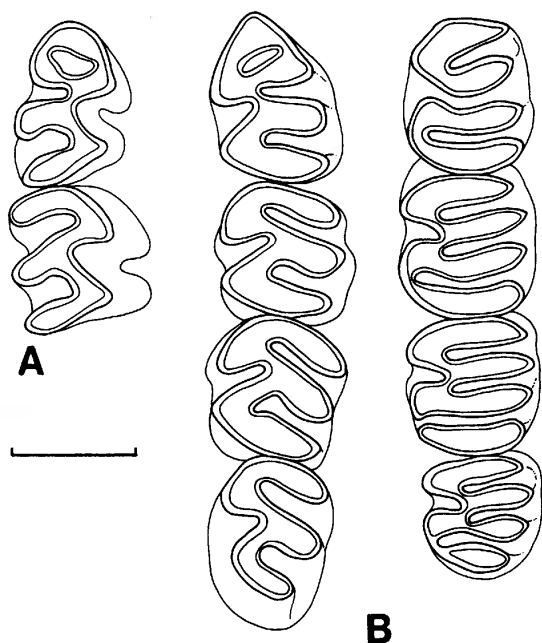


Fig. 6. Occlusal patterns of *Callistomys*: A, *Callistomys* sp., Lagoa Santa p4, m1; B, *C. pictus*, BMNH 80.9.15.1, left lower tooththrow (left), left upper tooththrow (right). Scale 2.5 mm.

divided by three flexi into four narrow, parallel lophs or laminae (fig. 2D).

Apart from a tendency of the lophids of *C. pictus* to be wider, its mandibular occlusal pattern is similar to that of *Echimyus* spp. The hypoflexids of the lower molars are more strongly oblique in both *Nelomys* spp. and *C. pictus* than in *Echimyus* spp. (fig. 2). The p4 of *C. pictus* is tetralophodont, while those of *Isothrix*, *Nelomys*, and *Echimyus* species are pentalophodont, a condition of most, but not all, other Echimyidae.

We note that the presence/absence of a mure between protocone and hypocone in the Echimyinae can be quite variable, and in some species of *Makalata* the same individual can have different character states for the same tooth on opposite sides of the jaw. This character in *C. pictus* (a mure on M1-3), therefore, should be confirmed by examining a larger series of specimens.

The lower incisors of *C. pictus* have a stronger curvature than those of *Nelomys* spp., which in turn, are more tightly curved

than those of species of *Isothrix* and *Echimyus* (fig. 3).

**SKULL AND MANDIBLE:** In species of *Echimyus*, *Isothrix*, *Nelomys*, and other echimyines, the jugal fossa is sharply defined; its dorsal rim is a sharp edge that anteriorly forms a sharp point where it dips ventrally near the ventral edge of the jugal bone. This point is above or behind the posterior half of M1 and well behind a line extended from the posterior border of the maxillary arm of the zygomatic arch (fig. 4). In *C. pictus* the dorsal edge of the jugal fossa flattens and nearly disappears anteriorly, so that the anterior part of the fossa forms a diffuse, dorsoventrally deep depression, with no point. The anterior edge of the fossa in *C. pictus* is above P4. The anterior area of origin of M. masseter lateralis is therefore broader and more anteriorly placed in *C. pictus* than in other echimyines. The superior maxillary root of the zygoma is broad and posteriorly expanded throughout its length to the jugal suture in *C. pictus*, in contrast to all other echimyines, where the superior maxillary zygomatic root is slender.

In *Nelomys* spp., the auditory meatus is positioned ventrally on the bulla, and consequently farther from the squamosal suture above it (fig. 4D). This distinguishes all *Nelomys* spp. from *C. pictus* and other echimyines.

A summary of the distribution of 12 characters (table 1) among the genera shows that *C. pictus* shares only 3 or 4 of the 12 with any other genus, when intermediate states are included as shared, and only 0 to 3 if they are not.

The unilaterally hypsodont curved cheek-teeth, expanded jugal and maxillary portions of the zygoma, enlarged tympanic bulla, and large auditory meatus of *C. pictus* are typical of species in some eumysopine genera, including *Clyomys*, *Euryzygomatomys*, *Carterodon*, and to some extent in *Proechimys* (*Trinomys*) and *Trichomys*, whose species are all terrestrial. The unilaterally hypsodont Eumysopinae all have three-rooted P4-M1-3, with a single, long, lingual root that probably remains open later than the labial roots and produces the curvature of the teeth, while in the Echimyinae that lack unilateral hypsodonty all taxa have four-rooted upper cheek-

TABLE 1

**Summary Of The Generic Distribution Of Primary Characters Mentioned In Text**

Black boxes = present; stippled boxes = present in some species but more weakly developed; white boxes = absent.

	<i>Callistomys</i>	<i>Isothrix</i>	<i>Echimyys</i>	<i>Nelomys</i>
1. Soft furred	■	■	□	□
2. P4-M1 unilaterally hypsodont	■	□	□	□
3. Hypoflexids M1-2 oblique	■	□	▨	■
4. Mure present M1-3	■	■	□	□
M1-2 split by 3 flexi into 4 laminae	□	□	□	■
5. P4 tetralophodont	■	□	□	□
6. Lower incisor strongly curved	■	□	□	▨
7. Jugal fossa sharply pointed anteriorly	□	■	■	■
8. Sup. maxillary root of zygoma expanded posteriorly	■	□	□	□
9. Inferior zygomatic root and jugal expanded dorsally	■	□	□	□
10. Auditory meatus enlarged	■	□	□	▨
11. Auditory meatus positioned ventrally on auditory bulla	□	□	□	■
12. Angular process of mandible expanded ventrally	■	□	□	▨

teeth. We do not know the root pattern for *C. pictus*, but externally it appears to be three-rooted.

## DISCUSSION

The genus *Callistomys* is thus far known only from a single fossil, four skulls, and a few skins of *C. pictus*. Our diagnosis of the genus is likely to be emended when more specimens become available.

Among living genera, *Callistomys* seems closest in cranial and dental characters to the echimyine genera *Echimyys* and *Nelomys*, but it shares unilateral hypsodonty and expanded zygomatic arches with Eumysopinae, so that it is intermediate in some features. As a group, the diagnostic characters of *Callistomys* suggest that the functional dynamics of its jaw and chewing apparatus differ from that of most other echimyines. Nonetheless, we assign it to the Echimyinae, while we await further evidence of its relationships.

*Callistomys* bears intriguing similarities to some Tertiary fossil Echimyidae. *Maruchito trilophodonte* (Vucetich et al., 1993) from the "Colloncuran" (middle Miocene) of Argentina, known from a few mandibles and isolated teeth, shares the hypsodonty and most features of the m1-2 enamel pattern of *Callistomys*. Both taxa have tetralophodont

upper molars with the posterior loph of M3 isolated from the rest of the tooth when unworn. *M. trilophodonte* differs in the retention of a pentalophodont p4, in less oblique flexids (particularly the hypoflexid), and in the retention of the mental foramen. These latter characters are all plesiomorphic for Echimyidae.

*Maruchito*, in turn, may be allied to the older Santacrucian (early Miocene) *Spaniomys*, *Adelphomys*, and *Stichomys*. *Spaniomys* retains tetralophodont lower molars, while *Adelphomys* and *Stichomys* have only three lophs (occasionally a very small fourth lophid is present). The upper molars of these three genera have four lophs, which become three with wear. These genera all have only one lingual root in the upper molars, but there is some evidence that in *Stichomys* it can become divided into two in adults. All show little unilateral hypsodonty.

Some of these genera were considered to belong to the Myocastorinae (Patterson and Pascual, 1968) or Dactylomyinae (Vucetich and Verzi, 1991), but recently Vucetich et al. (1993) suggested that these four should be grouped together into the Adelphomyinae, or some other group, pending revision of the family. Possibly *Callistomys* is more closely allied with these fossil taxa, than with living genera. Important differences between these

Miocene genera and *Callistomys*, however, are that the former have a mental foramen and showed marked increase in tooth size from p4 to m2. *Callistomys pictus* could represent a surviving remnant of an old branch of Echimyinae. *Callistomys* is no longer known to occur near Lagoa Santa, indicating a recent reduction in the geographic distribution of the genus.

Although specimens apparently have not been collected for decades, recently *C. pictus* has been found near the type locality in Bahia (Gustavo Fonseca, personal commun.). We hope that additional populations will be discovered and provide material for further study of the anatomy, genetics, and behavioral ecology of these most beautiful rodents, which may be the only survivors of their lineage.

SPECIMENS EXAMINED: *Callistomys pictus*: Natural History Museum, London (BMNH) 52.1.5.22; 80.9.15.1; Museu Nacional, Rio de Janeiro (MN) 31545. *Callistomys* sp:

Universitets Zoologisk Museum (ZMC), Copenhagen, Lund collection, uncataloged.

### ACKNOWLEDGMENTS

For facilitating access to specimens in their care, we thank Paulina Jenkins (BMNH); Tove Hattting (ZMC); and Luis Flamarion (MN). Travel to the BMNH was generously supported by the American Museum of Natural History, facilitated by Guy Musser, while that of GMV to the BMNH, ZMC, and MN was supported by Fundación Antorchas (A-13219/1-000070). The photographs of the Lund specimen (fig. 5) were kindly taken by G. Brovad. Richard Thorington, Jr. lent us his digital camera. We are grateful to the Smithsonian Institution, Division of Mammals, for providing research facilities for Emmons. We thank Alfred Gardner, Scott Steppan, and James Patton for constructive comments on the manuscript, and Albert Ditchfield for the Portuguese translation of the abstract.

### REFERENCES

- Luckett, W. P.  
1993. Ontogenetic staging of the mammalian dentition, and its value for assessment of homology and heterochrony. *J. Mamm. Evol.* 1: 269–282.
- Moojen, J.  
1952. Os Roedores do Brasil. Rio de Janeiro: Instituto Nacional do Livro.
- Patterson, B., and R. Pascual  
1968. New Echimyid rodents from the Oligocene of Patagonia, and a synopsis of the family. *Breviora* 301.
- Patterson, B., and A. E. Wood  
1982. Rodents from the Deseadan Oligocene of Bolivia and the relationships of the Caviomorpha. *Bull. Mus. Comp. Zool.* 149: 371–543.
- Patton, J. L., and O. A. Reig  
1989. Genetic differentiation among echimyid rodents, with emphasis on spiny rats, genus *Proechimys*. In K. H. Redford and J. F. Eisenberg (eds.), *Advances in Neotropical Mammalogy*, pp. 75–96. Gainesville: Sandhill Crane Press.
- Pictet, F.-J.  
1843. Seconde notice sur les animaux nouveaux ou peu connus du Musée de Genève. *Mém. Soc. Phys. Hist. Nat. Genève* 10: 201–213.
- Vucetich, M. G., M. M. Mazzoni, and U. F. J. Pardiñas  
1993. Los rodeos de la formación Collón Cura (Mioceno Medio), y la ignimbrita Pilcaniyeu, Cañadon del Tordillo, Neuquén. *Ameghiniana* 30: 361–381.
- Vucetich, M. G., and D. H. Verzi  
1991. Un nuevo Echimyidae (Rodentia, Hystricognathi) de la edad Colhehuapense de Patagonia y consideraciones sobre la sistematica de la familia. *Ameghiniana* 28: 67–74.
- Winge, H.  
1887[1888]. Jordfundne og nulevende Gnavere (Rodentia) fra Lagoa Santa, Minas Geraes, Brasilien. Copenhagen: E Museo Lundii.
- Wood, A. E.  
1984. The relationships, origin and dispersal of the hystricognathous rodents. In W. P. Luckett and J.-L. Hartenberger (eds.), *Evolutionary relationships among rodents*, pp. 475–513. New York: Plenum Press.
- Woods, C. A.  
1982. The history and classification of the

South American Hystriognath rodents:  
reflections on the far away and long  
ago. Pymatuning Lab. Ecol. Spec. Pub.  
6: 377–392.

1993. Suborder Hystriognathi. In D. E. Wil-  
son, and D. M. Reeder (eds.), *Mammal  
species of the world*, pp. 771–806.  
Washington: Smithsonian Institution.

**Note added in proof:** It has come to our attention since this article went to press that the presence of *I. picta* at Lagoa Santa was mentioned in a list, with no commentary, in C. Cartelle, 1994. Tempo passado. Mamíferos do Pleistoceno em Minas Gerais. ASECITA, 1–131. Belo Horizonte.

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